the Ectatommiini, but the deep scrobes of the head are unlike anything seen in other known Ponerine genera. *Paraponera*, to be sure, has scrobes, but these are of a very different conformation, being angulate and enclosing the eye in such a manner that the scape lies over, and the funiculus under the eye, when the antenna is folded back against the head, whereas in *Paranomopone* the whole scrobe is above the eye. In other respects the head shows close affinities with the Ectatommiini, so that, on the whole, I am inclined to assign it to this tribe. The peculiar ergatoid female is of unusual interest in connection with similar females of the genera *Onychomyrmex* and *Leptogenys* and the apparent absence of definite female forms in some of the other Australian ant-genera, notably *Rhytidoponera* sens. str., *Diacamma* and *Leptomyrmex*.

EXPLANATION OF THE PLATE.

Fig. 1. *Paranomopone relicta* sp. nov. Worker in profile.
Fig. 2. Head of same seen from above.
Fig. 3. Thorax and abdomen of same seen from above.
Fig. 4. Antenna.
Fig. 5. Female (ergatoid), in profile.
Fig. 6. Thorax and abdomen of same seen from above.
Fig. 7. Nearly full grown larva.
Fig. 8. Head of same from above.

NOTES ON THE EXTERNAL ANATOMY OF *BOREUS BRUMALIS* FITCH.[1]

By S. M. Dohanian.

In December, 1914, and January, 1915, a score or more of *Boreus brumalis* Fitch were found by Mr. Richard Mead in Weston, Mass., near the base of an oak tree. Another was found by the writer during the latter part of January in the Arnold Arboretum, Jamaica Plain, Mass., on melting snow near a brook. Investigation of this curious and interesting insect has called attention to

[1] Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 97.

the fact that very little is known about its habits and that it has never been carefully figured. To fill this want and to avoid such confusion in the identification of the members of this genus, as has recently occurred among a group of amateur entomologists in Germany,[1] the writer has undertaken to figure *B. brumalis* Fitch as carefully as possible and to redescribe it from the many specimens available, particularly as these show certain variations from the original description of Fitch.

The genus Boreus, first described by Latreille in 1825, contains ten or eleven recognized species. Of these only four are to be found in the United States, two in the eastern and two in the western parts of the country. The remaining ones are distributed over Europe and Asia.

Boreus brumalis was described many years ago by Asa Fitch (1847), accompanied by some notes on its occurrence in New York state. At the same time he described a second species, *B. nivoriundus*. Fitch's paper contains the first reference to the occurrence of Boreus outside of Europe. Both of the above species are to be found in New England, as there are in the collection of the Boston Society of Natural History specimens[2] from Jackson, N. H., Medford, West Roxbury and Stoneham, Mass., to which should be added also Weston and Jamaica Plain, Mass.

The life history as yet has not been worked out completely for any of the species of the genus, but they are all believed to be predacious on other winter insects and also those found hibernating under mosses, stones, etc. Friedrich Brauer, having found some larvæ of *B. hyemalis* L. in moss in 1856, believes that the life cycle covers a period of one year: the imago appears about the middle of October and remains in the adult state through the winter until April of the following year; early in the summer, about June, the larvæ hatch, undergo a rapid development, and remain in the full grown condition until the end of the summer; then they pupate and emerge as adults very soon thereafter; these are at first rather pale-colored and immature, an observation which is corroborated by both Dalman and Stephens from immature adults that were found by them in England under stones and moss (Westwood: Introd. Mod. Class. Ins., II, p. 54).

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[1] Entomologisches Jahrbuch für 1915, 24 Jahrgang, pp. 141–143.

[2] Mr. C. W. Johnson very kindly loaned these specimens to the writer.

Although they are saltatorial, their legs are not developed as are those of Orthopterous insects. The legs are extremely slender and long, the hind pair decidedly longer than the total length of the body.

Boreus brumalis Fitch.

Female. Length 3–3.75 mm., including ovipositor; polished, deep black-green; legs, antennæ and rostrum black and polished, but reflecting the light very feebly; ovipositor brilliantly polished, pure black. Antennæ inserted near the middle of the front, their bases nearer to margin of eyes than to each other; filiform; 2.15 mm. long; 22-, sometimes 23-jointed; the basal and second joints stout, slightly longer than wide; other joints one and one-half times as long as wide, gradually decreasing in length, but not in width, as the tip is approached so that the penultimate joint is about as long as it is wide; terminal joint ovate. Ocelli absent. Eyes bare; black; bulging out prominently, and extending back to the prothorax. Rostrum black, long-conical; twice as long as the head from which it gradually tapers; sparsely covered with light hairs; supra-clypeal piece just below the antennal cavities; maxilla with horny base, bearing six, short, transverse spines, serrate-spinose apically; maxillary palpi four-jointed, reaching beyond tip of beak; covered with long, light hairs, except last joint, which is the longest and slightly thicker than the others, long-ovate, bare. Labrum flat, more than four times as wide as long, but somewhat constricted in middle; labial palpi one-jointed, with a tuft of hair at tip. Mandibles bidentate, and rather sharp. Prothorax wider than long; coarsely, transversely striate; with an oblique groove extending from each anterior angle and meeting medially near the posterior border to form one, continuous, broad, U-shaped groove; a row of long, black hairs on both anterior and posterior margins. Mesothorax narrow, pubescent. Metathorax as long as prothorax; divided into three parts by two, deep, transverse grooves, which extend down the sides to the coxæ; middle portion much narrowed, allowing the small, round, first abdominal segment to protrude. Abdomen consisting of eight segments, tapering so that the last forms a part of the ovipositor; oval; segments distinctly marked by strongly impressed, transverse lines; the first segment small and partly hidden by the metathorax; all segments densely covered with fine, white, appressed hairs, especially behind. Ovipositor 0.8–1.0 mm. in length; composed of three segments, the middle piece the largest; brilliant black; sheathing style issuing from the seventh abdominal segment, shorter than the ovipositor; finely serrated on its apical third. Legs extremely long and slender, densely clothed with minute hairs; front legs as long as abdomen and ovipositor together, middle legs one and one-third times as long as front legs, and hind legs one and one-third as long as middle legs. Tibiæ with a pair of short spines at tips; posterior half of tibiæ and all tarsal segments with small, short spines. Tarsi five-jointed, the first joint as long as the next three, the second as long as the third and fourth together; the fifth terminated by a pair of small, slender, simple claws. Front wings merely scales; less than 0.2 mm. long and about as wide, with a median longitudinal ridge; tuberculate and set with very

short, erect hairs; hind wings degenerated into microscopic dots of the same shape as fore wings.

Male. Length 2.50–2.85 mm. Antennæ 23-, sometimes 24-jointed. Front wings 1.7 mm. long, 0.4 mm. wide at base when laid open flat; coriaceous; gradually narrowing toward the tip from which there issues a long, thorn-like spine; upper surface metallic, lustrous, sparsely pubescent; prominent spines issue from both sides of the trough-shaped wing into which the long, slender, chitinous hind wing fits snugly. Hind wing almost a bristle, its extremely sharp tip scarcely projecting beyond that of the fore wing; underside with a thick row of white, woolly pubescence; upper surface glabrous. Abdomen cylindrical, comparatively broader than in the female; the last four segments crowded dorsally and broadened ventrally so as to allow the genitalia to recurve upon the back, and the two prominent, stout, sharp-pointed hooks, each with an acute tooth in the middle of its inner edge and pilose along the outer edge, to point toward the head.

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EXPLANATION OF PLATE 9.

Boreus brumalis Fitch.

Fig. 1. Dorsal view, female.
Fig. 2. Wing of male.
Fig. 3. Front view of head.